

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
21 May 2004 (21.05.2004)

PCT

(10) International Publication Number  
**WO 2004/042187 A1**

(51) International Patent Classification<sup>7</sup>: **E21B 33/138**,  
43/16, 43/25, 43/26

(21) International Application Number:  
PCT/EP2003/050792

(22) International Filing Date:  
5 November 2003 (05.11.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
02079632.2 6 November 2002 (06.11.2002) EP

(71) Applicant (for all designated States except US): **SHELL  
INTERNATIONALE RESEARCH MAATSCHAPPIJ  
B.V.** [NL/NL]; Carel van Bylandtlaan 30, NL-2596 HR  
The Hague (NL).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **LIGTHELM, Dirk**,  
Jacob [NL/NL]; Volmerlaan 8, NL-2288 GD Rijswijk  
(NL).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE,  
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,  
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK,  
MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT,  
RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR,  
TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

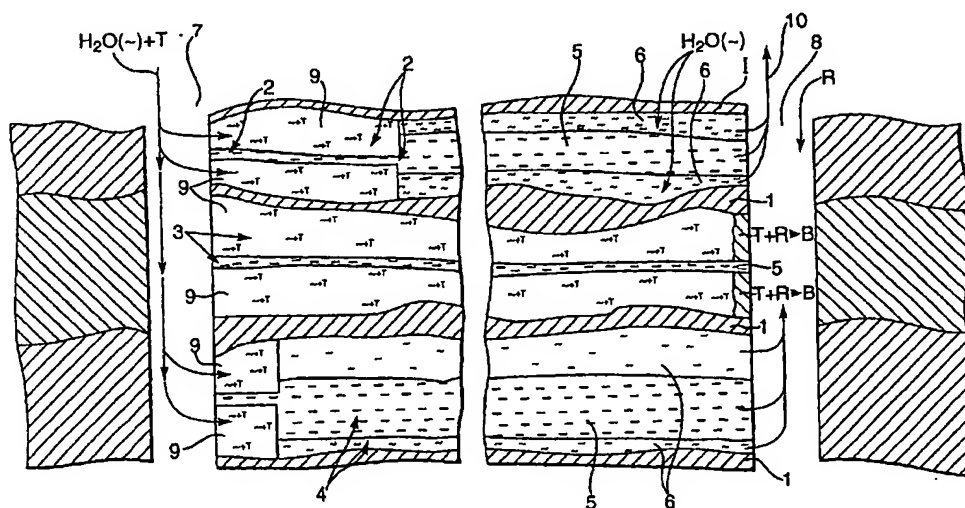
(84) Designated States (*regional*): ARIPO patent (BW, GH,  
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE,  
SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,  
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: INHIBITING BREAKTHROUGH OF DRIVING FLUID VIA A PERMEABLE GEOLOGICAL LAYER INTO AN OIL PRODUCTION WELL



(57) Abstract: A method for selectively reducing the permeability of one or more relatively permeable geological layers of an oil-bearing formation, to inhibit breakthrough of driving fluid from a driving fluid injection well via at least one of said layers into an oil production well, which method comprises the steps of injecting a driving fluid comprising a first compound into the formation via the injection well; detecting the first compound in well fluid of the oil production well; upon detection, injecting a second compound into the formation via the oil production well, to react with the first compound in order to provide a flow restriction generated by a third compound which comprises a reaction product of the first and second compounds in at least one relatively permeable geological layer through which breakthrough of the driving fluid into the oil production well has occurred.